Greatest Of All Times

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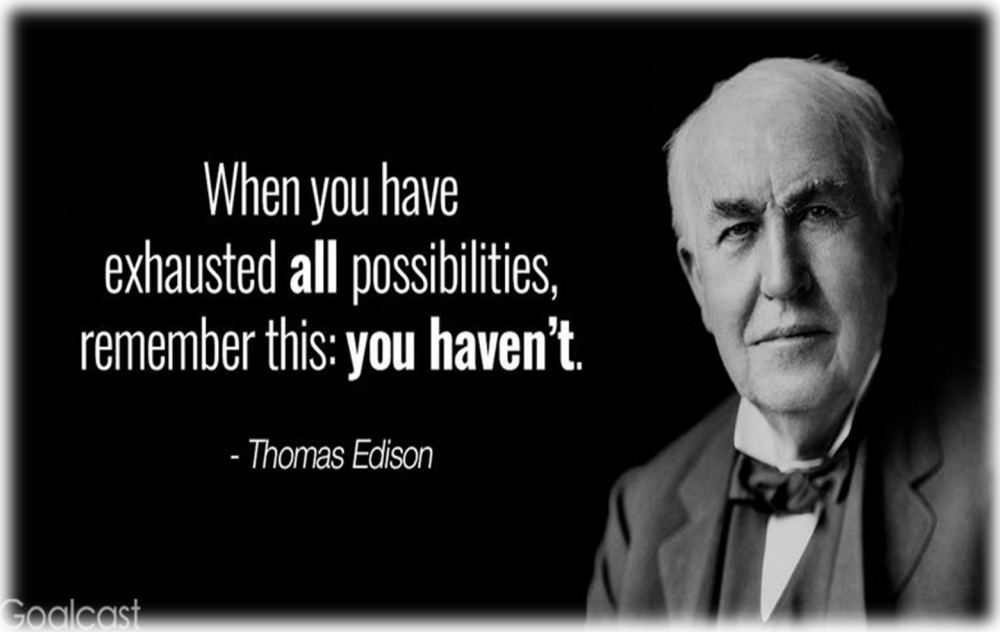

11 Feb 1847 <::><::><::> 18 Oct 1931

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The following timeline focuses on major events in Thomas A. Edison''s personal life and on his motion picture and phonograph inventions. For a more detailed of Edison''s life and work, please consult the Thomas A. Edison Papers website at Rutgers University External.

Timeline

1. **1847**
   Thomas Alva Edison born on February 11 in Milan, Ohio.
2. **1854**
   Edison's family moves to Port Huron, Michigan.
3. **1859**
   Edison takes job selling newspapers and candy on the Grand Trunk Railway.
4. **1862**
   Edison begins work as a telegraph operator in Port Huron.
5. **1863**
   Edison obtains telegraph job for the Grand Trunk Railway in Ontario.
   Edison returns to the U.S. in the fall and goes from city to city as a telegraph operator.
6. **1869**
   Edison arrives in New York City and eventually gets job at Laws' Gold Indicator Co. after fixing the company's stock ticker.
   Edison receives patent in June for his first invention, an electric vote recorder.
7. **1870**
   Edison opens his first workshop in Newark, New Jersey.
8. **1871**
   Edison marries Mary Stilwell on December 25.
9. **1873**

Edison's daughter, Marion Estelle ("Dot"), is born.

10. **1876**
    Edison moves to Menlo Park, New Jersey, and establishes laboratory.
    Edison's son, Thomas Alva, Jr. ("Dash"), is born on January 10.
11. **1877**
    Edison invents carbon telephone transmitter, extending the clarity and range of the telephone.
    Edison develops tin foil cylinder phonograph; files patent for it on December 24 which is awarded on February 19, 1878.
12. **1878**
    Edison Speaking Phonograph Co. incorporated April 24.
    Edison's son, William Leslie, is born on October 26.

Thomas Edison, 1878

13. **1878-79**
    Edison devises an electric incandescent light bulb that lasts for more than 13 hours.
14. **1879**
    Organizes the Edison Ore Milling Company.

1880-1889

Timeline

1. **1880**
   Edison discovers phenomenon which is later termed the "Edison Effect".
2. **1881**
   Edison creates the Edison Electric Lamp Co., the Edison Machine Works and other companies to produce his electric lighting system.
3. **1882**
   Edison opens a commercial electric station in New York City with approximately 85 customers.
   The Menlo Park laboratory is closed, and another instituted in New York City.
4. **1884**
   Edison's wife, Mary, dies on August 9.
5. **1886**
   Patent awarded to Chichester A. Bell and Charles Sumner Tainter for their wax cylinder graphophone; Edison later refuses to collaborate with them on the invention.
   Edison marries Mina Miller on February 24.
   Moves his laboratory to East Newark, New Jersey.

Edison's second wife, Mina, from *The Life and Inventions of Thomas Alva Edison* , by W. K. L. Dickson and Antonia Dickson, p. 349.

6. **1887**

Edison develops the New Phonograph, using a wax cylinder.
Edison Phonograph Co. formed in October.
Edison moves to a larger and more modern laboratory in West Orange, New Jersey.

7. **1888**
   Edison meets Eadweard Muybridge, who shows him his zoopraxiscope; Edison sets William K. L. Dickson and other assistants to work to make a Kinetoscope, "an instrument which does for the Eye what the phonograph does for the Ear".
   Improved Phonograph introduced, followed by the Perfected Phonograph.
   Edison's daughter, Madeleine, is born on May 31.
   Jesse H. Lippincott assumes control of phonograph companies by forming the North American Phonograph Co. on July 14; leases phonographs as dictation machines.
   Edison files his first caveat (a Patent Office document in which one declares his work on a particular invention in anticipation of filing a patent application) on the Kinetoscope and Kinetograph on October 8; William Kennedy Laurie Dickson assigned to work on project.
8. **1889**
   Edison produces dolls with tiny cylinders inside to make them talk for the Edison Phonograph Toy Manufacturing Co.; project ceases in March 1891.
   Edison General Electric formed in April.
   Edison Manufacturing Co. is organized.

1890-1899

1. **1890**
   Lippincott becomes ill and loses control of North American Phonograph Co. to Edison, its principal creditor.
   Edison's son, Charles, is born on August 3.
2. **1891**
   A peep-hole viewing machine shown by Edison on May 20 to participants from the National Federation of Women's Clubs.
3. **1892**
   Edison General Electric and Thomson-Houston merge into General Electric.

Thomas A. Edison with his children Madeleine and Charles, circa 1892, from *The Life and Inventions of Thomas Alva Edison*, by W. K. L. Dickson and Antonia Dickson, p. 352.

4. **1893**
   Construction on a film studio known to Edison employees as the "Black Maria" completed in February; earliest Edison motion pictures were filmed there.
   First public demonstration of Edison's 1 1/2" system of Kinetoscope at the Brooklyn Institute on May 9.
   Copyright registered to William K. L. Dickson for sample kinetoscope records on October 6.
5. **1894**
   Edison declares bankruptcy for the North American Phonograph Co.
   Applications submitted to U.S. Patent Office for the Kinetograph and the Kinetoscope.
   First Kinetoscope parlor opened in midtown Manhattan on April 14.
   Edison puts the Edison Manufacturing Co. in charge of the manufacture and sale of Kinetoscopes and films on April 1.
6. **1894-95**
   Edison and Dickson experiment to synchronize sound with film; the Kinetophone is invented which loosely synchronizes a Kinetoscope image with a cylinder phonograph.

7. **1895**
   The Edison Spring Motor Phonograph appears.
   Dickson leaves Edison's employ on April 2.
   C. Francis Jenkins and Thomas Armat demonstrate their Phantoscope, a motion picture projector, in Atlanta, Georgia, in late September to early October.
8. **1896**
   Edison forms the National Phonograph Co. with the purpose of manufacturing phongraphs for home use on January 27.
   Spring Motor Phonograph is released under aegis of the National Phonograph Co., followed by the Edison Home Phonograph.
   Edison negotiates in January with Raff & Gammon to manufacture the Phantoscope which Armat presents as his own invention; machine is renamed the Vitascope in February, and Edison's name put on it.
   Vitascope publicly exhibited at Koster & Bial's Music Hall on April 23 to great acclaim.
   The company begins practice of copyrighting its films on October 23 by sending short pieces of positive nitrate film from the motion pictures to the Library of Congress.
   Edison distances himself from agreement with Raff & Gammon; introduces the Projecting Kinetoscope or Projectoscope on November 30 in Harrisburg, Pennsylvania.
9. **1897**
   Edison Standard Phonograph manufactured.
   Edison begins to send positive paper prints of motion pictures for copyright deposit to the Library of Congress in August.
   James White hired to head Kinetograph Department at the Edison Manufacturing Co. in October.
   Edison begins legal battles in December that continue for the following year against other producers and exhibitors whom he charges with infringement.
10. **1898**
    Spanish-American War occurs; Edison Company sends cameraman to Cuba to film scenes of war.
    Edison's son, Theodore Miller, is born on July 10.

11. **1899**
    Edison Concert Phonograph introduced.

1900-1931

1. **1900**
   Edison Manufacturing Co. incorporated on May 5.
   Edwin S. Porter hired by Edison Co. in November to work with film equipment; he later becomes the company's most famous director.

Glenmont, Edison's home, circa 1892, from *The Life and Inventions of Thomas Alva Edison*, by W. K. L. Dickson and Antonia Dickson, p. 340.

2. **1901**

Process for mass-producing duplicate wax cylinders put into effect; they are known as Gold Moulded cylinders.
A new film studio for the Edison Co. in New York is completed in January; this is the nation's first indoor, glass-enclosed studio.
U.S. Circuit Court recognizes Edison's motion picture patent claims in his suit in July; American Mutoscope & Biograph Company appeals decision.
Edison cameras are present at Pan-American Exposition when President McKinley is shot by an assassin.

3. **1902**
   Circuit Court's decision reversed on March 10 by Court of Appeals, which essentially disallows Edison having a monopoly on motion picture apparatus.
4. **1903**
   One of the most famous early films, *The Great Train Robbery*, directed by Edwin S. Porter, is filmed during November.
5. **1905**
   Business Phonograph introduced.
   Nickelodeons become popular in Chicago and later spread to other urban areas.
6. **1908**
   Amberol Record introduced; the cylinder could play as long as four minutes, twice as long as previous cylinders.
   Association of Edison Licensees and Film Service Association formed; Motion Picture Patents Co. formed from it later to include Biograph licensees.
   New Edison film studio opened in the Bronx, New York, June-July.
7. **1909**
   Edwin S. Porter fired on November 10.
8. **1910**
   Company reorganized into Thomas A. Edison, Inc.
9. **1911**
   Edison Disc Phonograph shown in public for the first time.
10. **1912**
    Edison Disc Phonograph put on sale.
    Blue Amberol introduced, an unbreakable cylinder with superior sound.
11. **1913**
    Kinetophone is introduced, which attempts to synchronize motion pictures with a phonograph cylinder record.
12. **1915**
    Kinetophone abandoned.
    Tone tests for Diamond Discs introduced.
    Motion Picture Patents Co. found guilty of antitrust violation on October 1.
    Edison named head of the Naval Consulting Board.
13. **1917**
    American involvement in World War I begins; Edison creates Army and Navy Model of the Disc Phonograph.
14. **1918**
    Motion picture studio ceases production in February; studio sold on March 30 to the Lincoln & Parker Film Co.
15. **1926**
    Edison resigns as president of Thomas A. Edison, Inc., and becomes chairman of the board; his son, Charles takes over as president.
16. **1928**
    Edison takes over Splitdorf-Bethlehem Electrical Co., a move which allows him to manufacture radios.
    Edison awarded Congressional gold metal for his many contributions.
17. **1929**
    Edison makes programs for radio on long-playing discs; first used by radio station WAAM of Newark, New Jersey, on April 4.
    Edison Portable Disc Phonograph with New Edison Needle Records introduced.

Orders given on October 21 to close the Edison disc business.

18. 1931

Edison dies in West Orange on October 18.

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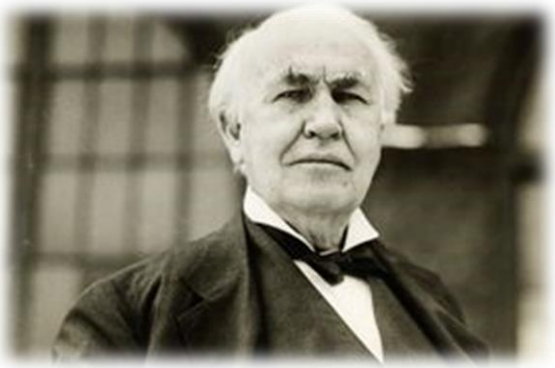
10 Inventions by Thomas Edison

https://science.howstuffworks.com/10-inventions-thomas-edison.htm

By: Martha Barksdale



If you take the thousands of patents Edison was issued, the guy (and his team at Menlo Park) averaged a patent every two weeks during his working life.

Without question, our lives would be very different without the inventions of Thomas Alva Edison. This prodigious creator changed our culture in countless ways with the seemingly miraculous devices that flooded out of his New Jersey laboratory.

Edison, born in Ohio in 1847, obtained his first patent at the age of 21. The last patent in his name was granted two years after his death, in 1933. In between, he tallied 1,093 United States patents and more than 1,200 patents in other countries [source: Rutgers]. Biographers have figured that Edison averaged a patent every two weeks during his working life. Even though many of his "inventions" were not unique -- and he engaged in some well-publicized court battles with other inventors whose ideas he "borrowed" -- Edison's skill at marketing and using his influence often got him the credit.

Most of Edison's inventions fall into eight main categories: batteries, electric lights and power, phonographs and sound recording, cement, mining, motion pictures, telegraphs and telephones. But while the Wizard of Menlo Park is remembered for his major inventions, such as the incandescent electric light and the phonograph, his tireless mind also came up

with some ideas that aren't so well-known -- and some that weren't welcomed by the public.

Keep reading to find out why members of Congress rejected a machine designed to make them more efficient and how another Edison invention frightened little girls and angered their parents.

Contents

10: Electrographic Vote-recorder

The 112th U.S. Congress convenes on Capitol Hill. The Senate still uses voice and roll call votes, while the House of Representatives can conduct voting electronically.

Edison was a 22-year-old telegraph operator when he received his first patent for a machine he called the **electrographic vote-recorder**. He was one of several inventors at the time developing methods for legislative bodies, such as the U.S. Congress, to record their votes in a more timely fashion than the time-honored voice vote system.

In Edison's vote-recorder, a voting device was connected to the clerk's desk. At the desk, the names of the legislators were embedded in metal type in two columns -- "yes" and "no." Legislators would move a switch on the device to point to either "yes" or "no," sending an electric current to the device at the clerk's desk. After voting was

completed, the clerk would place a chemically treated piece of paper on top of the metal type and run a metal roller over it. The current would cause the chemicals in the paper to dissolve on the side for which the vote should be recorded. "Yes" and "no" wheels kept track of the vote totals and tabulated the results.

A friend of Edison's, another telegraph operator named Dewitt Roberts, bought an interest in his machine for $100 and tried to sell it to Washington to no avail. Congress wanted no part of any device that would increase the speed of voting -- decreasing the time for filibusters and political wheeling and dealing -- so young Edison's vote-recorder was sent to the political graveyard.

9: Pneumatic Stencil Pen

In a roundabout way, Edison had a hand in that ink. He also sported his own tattoo: A 1911 policy issued by the Mutual Life Insurance Company reports that Edison had five dots in a pattern resembling the face of a die tattooed on his left forearm.

Edison invented the ancestor of the tattoo gun -- the pneumatic stencil pen. This electric pen, which Edison patented in 1876, used a rod tipped with a steel needle to perforate paper for printing purposes. It's important on its own as one of the first devices that could efficiently copy documents.

In 1891, tattoo artist Samuel O'Reilly was awarded the first patent for a tattoo machine -- a device allegedly based on Edison's stencil pen. O'Reilly apparently produced only one of the machines and that was for his own personal use -- there is no record of his marketing his device.

O'Reilly immigrated to New York City from Ireland in 1875. After he developed his tattoo machine, many sideshow and circus attractions began frequenting his shop at No. 11 Chatham Square. The machine was much quicker than hand tattooing, and the performers thought it gave cleaner results. After O'Reilly's death in 1908, a student took up his trade and machine and worked at Coney Island until the 1950s.

8: Magnetic Ore-separator

Edison saw dollar signs in magnets. Unfortunately, that didn't pan out financially.

Probably the biggest financial failure of Edison's career was the **magnetic ore-separator**. The idea, which Edison's laboratory experimented with during the 1880s and 1890s, was to use magnets to separate iron ore from unusable lower-grade ores. This would mean that abandoned mines could be profitable once again through the extraction of iron from sand at the sites. At the time, iron ore prices had risen to unprecedented heights.

Edison's laboratory was preoccupied with developing a magnetic ore-separator and putting it to practical use. He acquired rights to 145 abandoned mines and set up a pilot project at the Ogden mine in New Jersey. Edison poured money into the project, gradually selling most of his interest in the General Electric Company to pay for his work. But the engineering problems were never worked out and the price of iron ore fell, leading Edison to finally abandon his precious separator.

7: The Electric Power Meter

An array of meters, which prove handy when you're trying to figure out how much power a person or business is consuming.

All sorts of issues arise when you're doing something that has never been done before -- like running electrical services to businesses and residences. You need a way to measure how much customers consume so you'll know what to bill them.

Edison solved this problem by patenting the Webermeter in 1881. The Webermeter contained two or four electrolytic cells with zinc at both electrodes and a zinc sulfate solution. The zinc transferred from one electrode to the other at a set rate as electricity was used. The meter reader removed the electrolytic cells at each reading for weighing, replacing them with new ones.

6: Method of Preserving Fruit

He was even interested in fruit!

Another Edison invention came about from the laboratory's work with glass vacuum tubes while developing the incandescent light bulb. A development, we should add, that is not solely Edison's. Many others were involved in the research and labor of the light bulb production -- but Edison got the much-sought after patents.

But getting back to our story. In 1881, Edison filed for a patent for a method to preserve fruits, vegetables or other organic substances in a glass vessel. The vessel was filled with the items to be preserved, and then all the air was sucked from it with an air pump. The vessel tube was sealed with another piece of glass.

Another food-related invention, wax paper, is often attributed to Edison, but it was invented in France in 1851 when Edison was just a child. Edison did use wax paper in his sound recording work, which might be where the story originated.

5: Alkaline Battery for Electric Cars

You were a little ahead of your time on this one, Edison. Also, those batteries didn't work too well.

Edison believed cars would be powered by electricity, and in 1899 he began to develop an alkaline storage battery that would power them. He was on to something: In 1900, about 28 percent of the more than 4,000 cars produced in America did run on electricity [source: PBS]. His goal was to create a battery that would run for 100 miles (161 kilometers) without recharging. Edison gave up the project after about 10 years because the ready abundance of gasoline made the electric car a moot point.

But Edison's work wasn't in vain -- storage batteries became his most profitable invention and were used in miners' headlamps, railroad signals and marine buoys. His friend Henry Ford also used Edison's batteries in his Model Ts.

4: Concrete House

Would Edison approve of this modern day concrete house located in Marina del Rey, Calif.?

Not satisfied with having improved the average American's life with electric lights, movies and phonographs, the Wizard of Menlo Park decided in the early part of the 20th century to abolish city slums and get every working man's family into sturdy, fire-proof homes that could be built inexpensively on a mass scale. And what would those homes be made of? Why, concrete, of course, using materials from the Edison Portland Cement company. Edison, recalling his own working-class upbringing, said he would take no profit if the venture succeeded.

Edison's plan was to pour the concrete into large, wooden molds the size and shape of a house, let it cure, remove the framework and -- voila! A concrete house, with decorative molding, plumbing pipes, even a bathtub, molded right in. Edison said these dwellings would sell for around $1,200, about one-third the price of a regularly constructed house at the time.

But while Edison Portland Cement was used in a lot of structures around New York City during the building boom of the early 1900s, the concrete houses never caught on. The molds and equipment needed to make the homes required a huge financial investment that few builders were able to make. Image was another problem -- not many families wanted the social stigma of moving to a house that was touted as getting people out of the slums. One other factor: Some people thought the homes were ugly. While the company did build a few concrete houses around New Jersey -- some still standing today -- Edison's vision of concrete neighborhoods never took [source: Onion].

And what did Edison expect you to furnish your concrete home with? Keep reading to find out why the inventor wouldn't have been a good interior designer.

3: Concrete Furniture

Concrete furniture is perfectly fine for outside, but is it what you're looking for in your couch potato moments

Why should a young couple go into debt to purchase furniture that will last only a few decades? Edison proposed that for half the money, they could obtain a house full of concrete furniture that would endure for eternity. Made with air-impregnated foam to keep the weight at only one-and-a-half times that of wooden furniture, Edison's line of concrete furnishings would be sanded and smoothed into a mirror-like finish or stained to look like wood grain. He claimed he could furnish an entire house for less than $200.

In 1911, Edison's company molded a piano, bathtub and cabinets that could house Edison's phonographs. They shipped the phonograph cabinets around the country as a publicity stunt, and Edison affixed stickers on the packaging, asking the shippers to please handle them roughly. The cabinets were to be unveiled in New York City at the

annual cement industry show, but Edison didn't show up, and the cabinets weren't heard of again. Suspicions are that the cabinets didn't survive the trip.

2: Phonograph for Dolls or Other Toys

As far as we know, Edison did not dabble in phonographs for dogs. Dolls, yes. Dogs, no.

Once Edison had patented his phonograph, he began to devise ways to use it. One idea, first mentioned in a laboratory note in 1877, but not patented until 1890, was to miniaturize the phonograph and insert it into a doll or other toy, giving the formerly inarticulate plaything a voice of its own. The phonograph was enclosed in a tin casing that composed the doll's chest, then pre-made arms and legs were attached, along with a bisque head made in Germany. The talking dollies sold for about $10. Little girls sat in factory stalls and recorded the songs and nursery rhymes that were inscribed on the wax cylinders for the phonographs to play.

Unfortunately, the idea of a talking toy was far ahead of the technology needed to execute it. Sound recording was in its infancy, and the cracklings and hissing on early records were more disturbing when they were supposed to be the voices of sweet-faced dolls.

"The voices of the little monsters are exceeding unpleasant to hear," one customer complained. Most dolls did not play at all, or the voice was too faint to be heard. The doll's fragile form did not protect the delicate mechanism from shaking and jolts, and its purpose as a child's toy almost guaranteed the phonograph for dolls would not get the delicate care it required.

1: The Spirit Phone

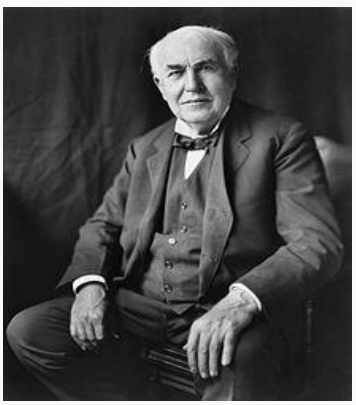
Wouldn't it be cool if you could just dial up a spirit?

Taking the idea of the telephone and the telegraph a bit further, Edison announced in October of 1920 that he was working on a machine to open the lines of communication with the spirit world. In the aftermath of World War I, spiritualism was undergoing a revival, and many people hoped science could provide a means to access the souls of the recently deceased. The inventor, himself an agnostic who admitted he had no idea if a spirit world even existed, spoke of his quest in several magazines and explained to The New York Times that his machine would measure what he described as the life units that scatter through the universe after death.

Edison corresponded with British inventor Sir William Crookes, who claimed to have captured images on "spirit photographs." These photos allegedly encouraged Edison, but he never introduced any machine that he said could communicate with the dead, and after his own death in 1931, no machine was found. Many people believe he was just playing a joke on the reporters he'd talked to about his "spirit phone."

Some people claimed that at a séance in 1941, Edison's spirit told the participants that three of his assistants possessed the plans. The machine was reportedly then built, but did not work. Later, at another séance, Edison supposedly suggested some improvements. Inventor J. Gilbert Wright was present and worked on the machine until his own death in 1959, but, as far as we know, never used it to contact spirits.

Thomas Edison



Edison c. 1922

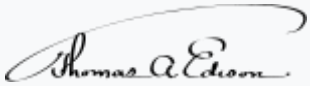
Born	Thomas Alva Edison February 11, 1847 Milan, Ohio, U.S.
Died	October 18, 1931 (aged 84) West Orange, New Jersey, U.S.
Burial place	Thomas Edison National Historical Park
Education	Self-educated; some coursework at Cooper Union
Occupations	• Inventor • businessman
Years active	1877–1930
Known for	hide *See list* • Edison effect • Edison light bulb • Edison screw • Edison's Phonograph Doll • Electric pen • Edisonian approach • Edison–Lalande cell • Acoustic telegraphy • Carbon microphone • Etheric force • Fluoroscopy • Electric power distribution • Grasshopper telegraphy • Kinetoscope • Nickel–iron battery • Phonograph • Phonomotor • Quadruplex telegraph • Tasimeter • War of the currents • Founder of General Electric
Spouses	• Mary Stilwell (m. 1871; died 1884) • Mina Miller (m. 1886)
Children	6, including Madeleine, Charles, and Theodore
Relatives	Lewis Miller (father-in-law)
Awards	hide *See list* • Matteucci Medal (1887) • John Scott Medal (1889)

- Edward Longstreth Medal (1899)
- John Fritz Medal (1908)
- Franklin Medal (1915)
- Navy Distinguished Service Medal (1920)
- Congressional Gold Medal (1928)

Thomas Edison's Voice

Edison reciting Mary Had a Little Lamb
Recorded 1929

Signature



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CHAPTER 12 – THOMAS ALVA EDISON

KAREN GARVIN

Thomas Alva Edison (1847–1931), the "Wizard of Menlo Park," was an American inventor. Considered to be a true genius, Edison created the world's first research laboratory, where his systematic approach to inventing focused on practical results rather than theoretical knowledge. Although best known for his improvements to the light bulb and for creating the phonograph and motion picture camera, much of Edison's work was related to the generation and distribution of electricity.

Figure 1. Thomas Alva Edison, c. 1904. Library of Congress, Prints and Photographs Collection, LC-USZ62-108087.

Edison was born on February 11, 1847, in Milan, Ohio. He was the youngest of seven children and had limited formal education, which would later feed the myth that he was "a poor boy, uneducated and entirely self-taught." In fact, during 1854 Edison attended a private school run by Reverend George Engle and from 1859 to 1860 he attended the Port Huron School. Edison, who would later describe himself as a "delicate" small boy, was mostly homeschooled by his mother, a former high-school teacher, who taught her son "how to read good books quickly and correctly." Edison devoured books on history, philosophy, and science. He liked to do chemical experiments and even strung up a telegraph wire to a friend's house so they could send messages to each other.

In 1859, Edison began working as a newsboy on the Grand Trunk Railroad line, where he earned pocket money to buy materials for his home chemical laboratory. The twelve-year-old Edison rode the train and sold newspapers and magazines, but he also had a great deal of free time. In 1862 he purchased a small printing press, which he set up in the baggage car. From this makeshift office, Edison printed his own newspaper, the *Weekly Herald*. Edison also conducted chemical experiments until a fire broke out and he was evicted from the train.

Edison learned telegraphy and, despite noticing that he was developing a hearing loss, spent the next several years working as a telegraph operator. In early 1868 he moved to Boston and took a job with Western Union. During his free time there he designed and patented his first invention: an electronic vote recorder, which was met with indifference by lawmakers in Washington.

Despite this initial setback, Edison quit his job at Western Union in January 1869 so that he could become a full-time inventor. He moved to New York City in April 1869, and in February 1870 he signed a contract with Gold and Stock Telegraph Company to do research and development on improvements to telegraph equipment. Edison began working on designs for an improved stock ticker, which he named the Universal Stock Printer.

Edison sold the rights to the stock ticker to the Gold and Stock Telegraph Company for $40,000. Then, he used the money to set up the Newark Telegraph Works in Newark, New Jersey. That same year, an investor put up enough money for Edison to open a second shop, the American Telegraph Works. Between the two companies, Edison employed more than 160 men.

Edison soon outgrew the facility in Newark, and in December 1875 moved his operations to Menlo Park, New Jersey. He had a two-story laboratory built to his specifications, which housed a machine shop on the ground floor and a chemical laboratory on the second floor. Edison opened the laboratory in the spring of 1876 with a staff of five: two experimenters and three machinists. The Menlo Park lab was quickly dubbed "the invention factory" by reporters, and it was one of the first research and development laboratories. Edison's system was to come up with ideas and assign teams of researchers to work on projects, whom he referred to as "muckers." By having multiple teams engaged in developing marketable products, it was possible for the lab to be more productive than a lone inventor could ever have been.

To keep Menlo Park running, Edison needed money. His method of raising money was to pursue only the inventions that were both "practical and profitable." In the summer of 1877, Edison came up with an idea for a machine that would record and play back sound messages. His prototype used a stylus that vibrated from the pressure of sound waves and carved small grooves on a piece of tin foil wrapped around a cylinder. The foil cylinder was later replaced by wax cylinders. The phonograph became a commercial success and put Edison in the public spotlight, earning him the epithet "Wizard of Menlo Park."

By early 1878, the laboratory staff had increased to 25, and by the 1880s expanded to a maximum of 50 to 60 employees. Edison added a separate machine shop and several other buildings to the Menlo Park site, and even provided a boardinghouse for some of his employees. For a short time, Nikola Tesla (1856–1943) was employed by Edison as an electrical engineer. Both men were dedicated workaholics, but a rift developed between them after Edison supposedly promised Tesla fifty-thousand dollars if he could increase the efficiency of Edison's electric dynamo. After Tesla succeeded, Edison claimed it had been a joke but counteroffered a raise in pay. Tesla, believing he had been cheated, resigned.

In 1878, Edison began work on developing a longer-burning filament for electric light bulbs. Existing bulbs burned out within just a few hours; Edison realized that in order for the bulbs to be commercially viable they needed to last much longer. He did not invent the light bulb, however—the credit for that goes to English scientist Humphry Davy, who, in the early 1800s, had connected batteries to charcoal sticks and generated an arc of electricity to produce incandescent lighting. On October 14, 1878, Edison filed a patent application for "Improvement in Electric Lights," but he continued to refine the bulb and submitted another patent application on November 4, 1879.

Eventually, after Edison and his muckers tested thousands of materials for the light bulb filament, including carbonized cardboard and platinum, Edison discovered that a carbonized bamboo filament would last more than a thousand hours before it burned out. Edison made further improvements, such as evacuating the air from the glass bulb and designing the screw base for the light bulb, which is still in use today.

Edison began to manufacture and market his bulbs, but delivering electricity to run them was still problematic. But instead of just fabricating pieces of the electric puzzle, it was Edison's intention to create a whole system, from electrical generation and distribution to the end products for home and business use. In December 1880, Edison founded the Edison Illuminating Company with the purpose of constructing electrical generating stations. In 1881, he purchased a large building in Manhattan and obtained permission from the city to dig up the streets in order to lay nearly fourteen miles of electrical conduits. Edison's Pearl Street Power Station opened in 1882, and it used coal to power an electrical generator. This central power company delivered direct current (DC) electricity to his customers.

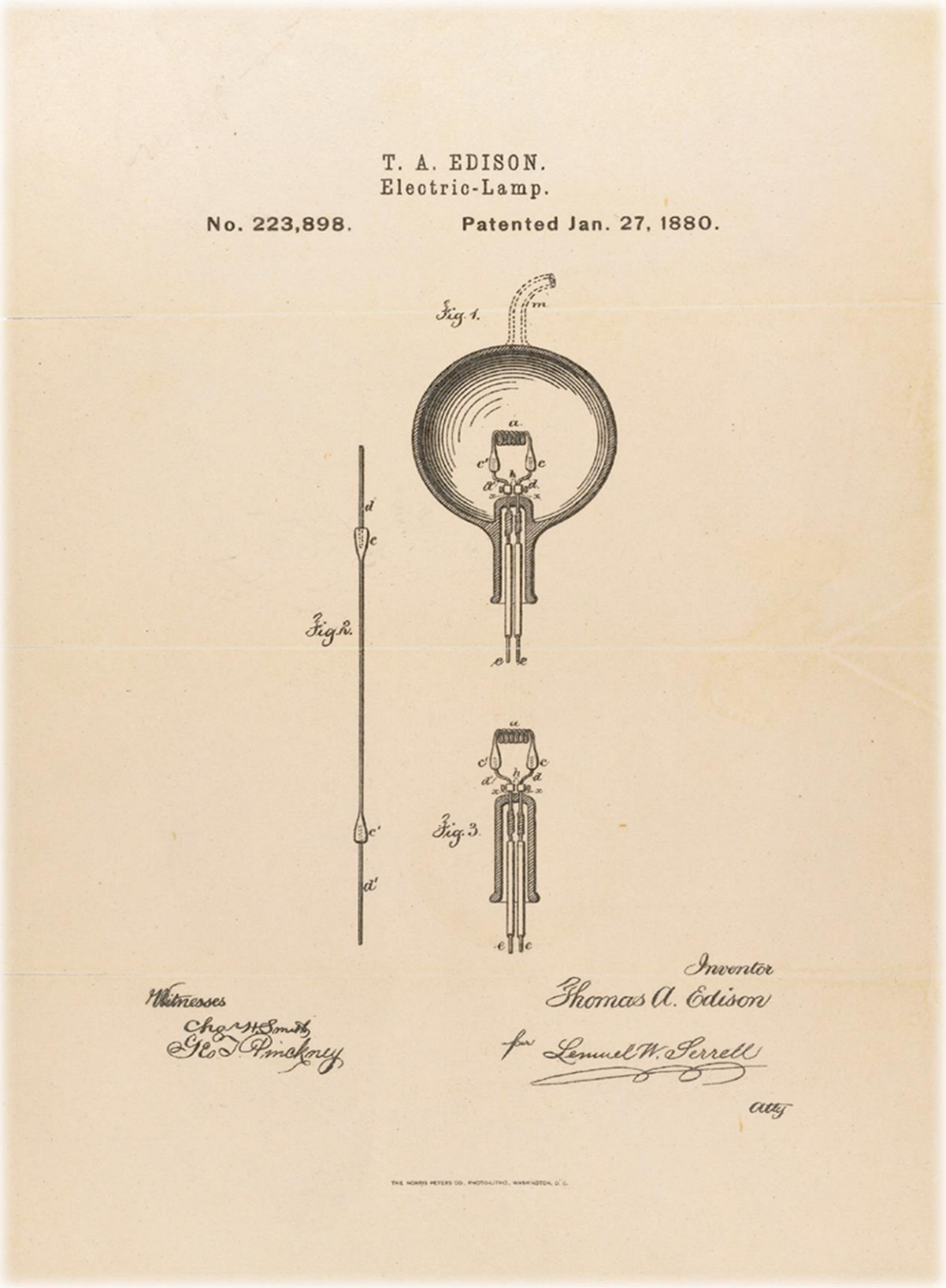

Figure 2. Edison's patent for the Electric-Lamp. Note the coiled filament inside the bulb. U.S. National Archives and Records Administration, "Drawing for an Electric Lamp," National Archives Catalog, https://catalog.archives.gov/id/595450.

In a DC system, electrical current flows in one direction and is relatively low voltage. But while Edison's DC distribution system was successful, it had several major drawbacks: the voltage could only be sent over short distances before it dropped too low to be useful, and the voltage could not be changed easily for varying electrical loads, which meant that each electrical device needed its own power lines. A competing power system, one favored by Edison's ex-employee Tesla, was alternating current (AC), which allowed electricity to be sent over many miles of wire without loss and used a system of transformers to change voltages so that lighting and motors could be operated from the same power lines.

In 1886, William Stanley Jr. (1858–1916) had successfully electrified Great Barrington, Massachusetts, using alternating current. While others, including Tesla and George Westinghouse (1846–1914), believed that an AC distribution system was safe, Edison felt strongly that it was dangerous because of the high voltages it used and its tendency to spark. Indeed, several deaths, including the ghastly public spectacle of the electrocution of lineman John Feeks, had already taken place.

By now Edison had invested a great deal of cash in his own DC system, which served only one square mile of customers, and he was fighting to keep his system financially solvent. He appealed to public emotion about the safety of his DC system, but the differences of opinion between proponents of DC and AC devolved into a bitter rivalry that became known as the "War of the Currents." It was a losing battle for Edison: in 1891 the *Electrical World* magazine reported that there were just over 200 Edison DC power stations in use, versus nearly 1,000 operational AC power stations. When the contract for electrifying the 1893 Chicago World's Columbian Exposition was awarded to Westinghouse, who used Tesla's AC system, it cemented the superiority of alternating current for electrical distribution systems.

Nevertheless, Edison's business continued to grow, and in 1887 he built a larger research facility in West Orange, New Jersey, where he became increasingly involved in management. Construction on the new laboratory began in May and the facility was occupied by the new year. Unlike the informal research facility of Edison's younger days, this new laboratory employed university-trained scientists and utilized large-scale teamwork in its research methods. Although Edison made no claims for himself about being a "pure scientist," he nevertheless read professional literature, even as he disdained the career of a pure scientist.

During his time at his West Orange lab, Edison continued to refine his phonograph and, after seeing the work of photographer Eadweard Muybridge (1830–1904), came to believe that motion could be captured on film. On July 31, 1891, Edison filed a patent for his motion picture camera. Never one to do half measures, Edison built a motion picture studio at the West Orange research park, called the Black Maria, in 1893.

Some of the early films created at the studio were shown in Kinetoscopes, which were wooden boxes that housed rollers and spools for a single film. The first Kinetoscope parlor opened on April 14, 1894, in New York, where viewers could pay to watch the

movies. The first commercial motion picture intended for a large audience was projected at Koster and Bial's Music Hall in New York City on April 23, 1896.

Figure 3. Interior of Thomas. A. Edison Laboratories, Building No. 2, West Orange, New Jersey. Apparatus on the table was used to make a steel master for the mass production of phonograph records. Photo: Jet Lowe, Library of Congress Prints and Photographs Division.

During the 1890s, Edison began experimenting with something completely different: he built an iron ore separating plant in Ogden, New Jersey, that crushed rocks and used an electromagnet to separate the iron ore from the rock. After several expensive upgrades to the plant, and the discovery of high-grade iron ore deposits in the Great Lakes area, Edison realized the unprofitability of this venture. But while the iron had never been a moneymaker, his company had sold crushed rock to cement companies. Thus, Edison followed the money trail and in 1899 he organized the Edison Portland Cement Company, which opened in 1901.

Next, Edison turned his attention back to a project that he had been interested in for years: a storage battery. In 1901, he formed the Edison Storage Battery Company and

began working on a storage battery for electric cars. An "E" type of alkaline storage battery was produced in 1903, but there were problems with the batteries leaking and they did not recharge properly. In 1909, a new "A" type of nickel-iron alkaline battery was manufactured, and in 1910, two electric cars with Edison batteries climbed Mt. Washington in New Hampshire on a promotional tour.

In 1915, Secretary of the Navy Josephus Daniels (1862–1948) appointed Edison as president of the newly formed Naval Consulting Board. The board comprised civilian experts who would review technology-related suggestions submitted by the public for possible military application. Edison petitioned the government to establish a permanent research laboratory, but resigned from the naval board in January 1921. Eventually the lab was constructed and the Naval Research Laboratory began operations on July 2, 1923.

In 1927, Edison, now 80 years old, joined forces with Henry Ford (1863–1947) and Harvey Firestone (1868–1938) to form the Edison Botanic Research Corporation in Fort Meyers, Florida. The company's goal was to find a domestic source of rubber so that America would not be dependent on foreign sources in case of another war. More than 17,000 plants were tested before goldenrod was selected as the most viable source for rubber.

Edison married twice and had six children, although his heavy work schedule left little time for family. In 1871, he met Mary Stilwell (1855–1884), who was working at the News Reporting Company, a short-lived business venture of Edison's. He proposed and they were married on Christmas Day. They had three children: Marion (1873), Thomas (1876), and William (1878). Mary's health declined and she died in 1884.

In 1885, while on a trip to New Hampshire with a group of friends, Edison met and proposed to Mina Miller (1865–1947). They married on February 24, 1886, and also had three children: Madeleine (1888), Charles (1890), and Theodore (1898).

Edison's research spanned a wide range of electrical improvements and inventions, including small electrical appliances for home use, such as a coffeemaker and iron. He received 1,093 patents and won awards that included the French Légion d'Honneur in 1881 and the Congressional Gold Medal in 1928. He died on October 18, 1931, at his home in Glenmont, New Jersey.

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6 Key Inventions by Thomas Edison

https://www.history.com/news/thomas-edison-inventions

Edison's genius was improving on others' technologies and making them more practical for the general public.

By: Patrick J. Kiger

Thomas Edison applied for his first patent in 1868, when he was just 21 years old. The famous inventor's first brainchild was for a device that recorded legislative votes. That was just the start of a career in which he would obtain 1,093 U.S. patents, in addition to another 500 to 600 applications that he either didn't finish or were rejected. But Edison's greatest invention may have been developing a new process for coming up with inventions.

"When Edison raised enormous capital, built a laboratory in Menlo Park, N.J., and hired a staff of several dozen, each with distinct talents, he pioneered what became the modern corporate research and development process," explains Ernest Freeberg, a historian at the University of Tennessee, Knoxville and author of *The Age of Edison: Electric Light and the Invention of Modern America*.

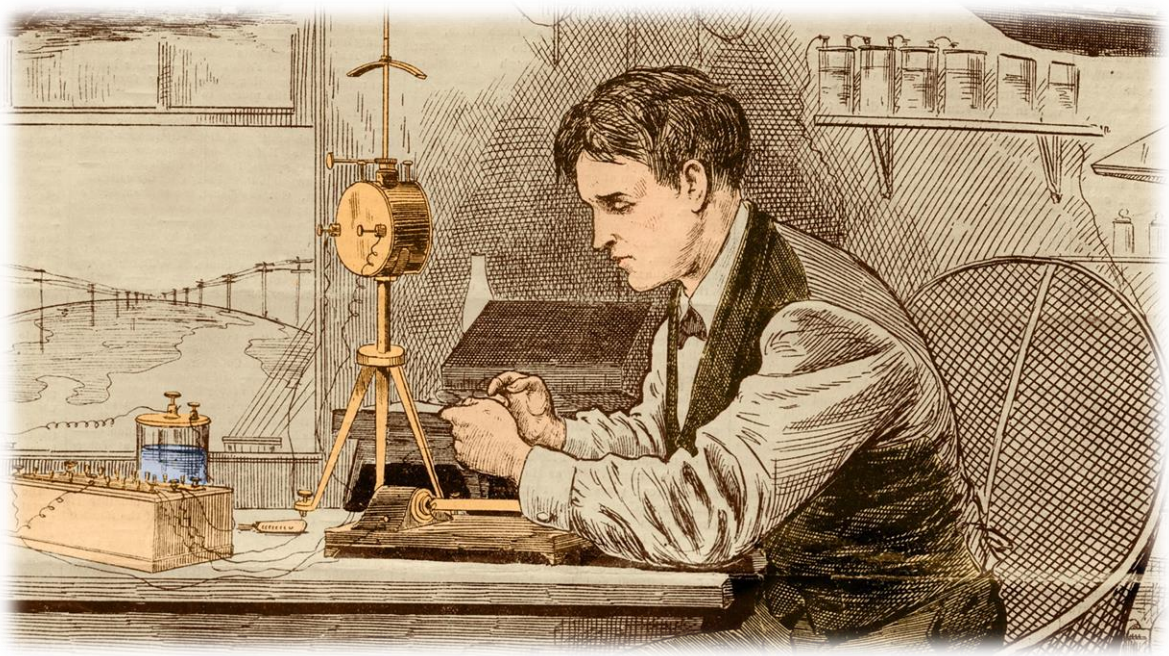
"He considered it an invention factory, one that would produce surprising new products at a regular rate."

In many cases, Edison's genius was taking a new technology that someone else had pioneered and developing a superior way of doing the same thing. "An invention not only has to work fairly well, but it has to be something that the market wants and can afford to buy. Edison understood that as well as anyone in his day," says Freeberg.

Below are some of Edison's most significant inventions.

While Samuel Morse's invention of the telegraph in the 1830s and 1840s made it possible for the first time to communicate over long distances, the device had its drawbacks. An operator had to listen to incoming dots and dashes in Morse code, which slowed messages to a speed of 25 to 40 words per minute. A British system for automatically printing code in ink on paper only achieved 120 words tops.

Automatic Telegraph

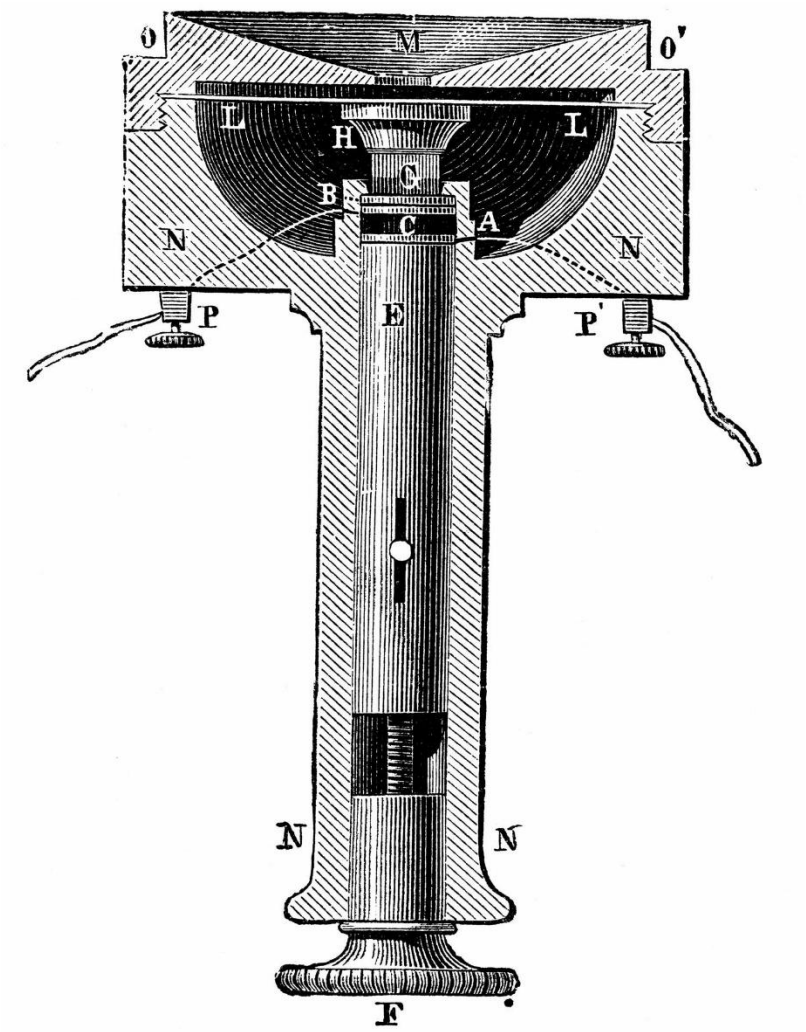


THOMAS EDISON PICTURED OPERATING A TELEGRAPH MACHINE.

Between 1870 and 1874, Edison developed a vastly superior system, in which a telegraph receiver utilized a metal stylus to mark chemically-treated paper, which then could be run through a typewriter-like device. It was capable of recording up to 1,000 words a minute, which made it possible to send long messages quickly.

Carbon Telephone Transmitter

It was Alexander Graham Bell who patented the telephone in 1876. But Edison, with his knack for building upon others' innovations, found a way to improve Bell's transmitter, which was limited in how far apart phones could be by weak electrical current. Edison got the idea of using a battery to provide current on the phone line and to control its strength by using carbon to vary the resistance.



CROSS-SECTION OF EDISON'S LAMP-BLACK BUTTON TELEPHONE TRANSMITTER.

To do that, he designed a transmitter in which a small piece of lampblack (a black carbon made from soot) was placed behind the diaphragm. When someone spoke into the phone, the sound waves moved the diaphragm, and the pressure on the lampblack changed. Edison later replaced the lampblack with granules made from coal—a basic design that was used until the 1980s.

The Light Bulb

Contrary to popular belief, Edison didn't actually invent the incandescent light bulb. But he invented and marketed a design that was the first to be long-lasting enough to be practical for widespread use.

"Edison was one of a half dozen who were putting the elements of a viable lighting system together in those years, and since Edison was late to the race, he benefited from all his predecessors and rivals," Freeberg explains.

In the late 1870s, Edison designed a vacuum bulb, in which a metal filament could be heated to create light. One night, after absent-mindedly rolling between his fingers a piece of lampblack, the material he used in his telephone receiver, he got the idea of switching to a carbonized filament. After initially using carbonized cardboard, he began experimenting with other materials and eventually settled upon bamboo, which possessed long fibers that made it more durable. Eventually, the combination of bamboo filaments and an improved vacuum pump that removed air more effectively enabled Edison to increase the lifetime of bulbs to approximately 1,200 hours.

Phonograph

THOMAS EDISON PICTURED WITH HIS PHONOGRAPH.

While developing his telephone transmitter, Edison got the idea of creating a machine that could record and play back telephone messages. That notion led him to imagine being able to record not just voices, but music and other sounds, by using sound to vibrate a diaphragm and push a stylus that made indentations on a cylinder covered with wax paper that was being turned by a crank.

In late 1877, he got a machinist to build the device, using tin foil instead of wax, and Edison recorded the nursery rhyme "Mary Had a Little Lamb." The following year, he was granted a patent for the design, which also included a lighter needle to find the groves and transmit vibrations to a second diaphragm, which recreated the person's voice.

Edison's phonograph created a sensation and helped enhance his reputation as a great inventor. Eventually, he began to market and sell the machines and cylinder records, reverting again to using wax. But by the early 1900s, the Victor Talking Machine Company's phonographs that played discs surpassed Edison's cylinder phonographs in popularity. Even though cylinders produced better-quality sound, the early discs had a big advantage in that they could fit four minutes of music, compared to the two minutes that could fit on a cylinder.

Movie Camera and Viewer

A KINETOGRAPH CAMERA, 1912.

In the late 1880s, Edison supervised his lab's development of a technology "that does for the eye what the phonograph does for the ear." Most of the work on the Kinetograph, an early movie camera, and the Kinetoscope, a single-person peephole movie viewer, was actually performed by Edison's employee William Kennedy-Laurie Dickson.

Movies became a big industry and Edison's camera and viewer were quickly replaced by innovations such as the Lumière Cinématographe, a combination camera, printer and projector that allowed audiences to watch a film together. But Edison adjusted and his company became a thriving early movie studio, churning out scores of silent films between the 1890s and 1918 when it shut down production.

Alkaline Storage Battery

When the automobile was developed in the late 1800s, electric vehicles were more popular than those equipped with gasoline-burning internal combustion engines. But early electric cars had a big drawback—the

batteries they used were heavy and tended to leak acid, which corroded the cars' interiors.

Edison decided to take on the challenge of inventing a lighter, more dependable and more powerful battery. After conducting extensive research and the embarrassing flop of an early design, Edison came up with a reliable alkaline battery, and in 1910 began production of it. His work, however, was soon overshadowed by Henry Ford's development of the inexpensive Model T car that ran on an internal combustion engine. Nevertheless, Edison's storage battery was used in mining lamps, trains and submarines and turned into the most successful product of Edison's later career.

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Major Inventions

https://www.thomasedison.org/inventions

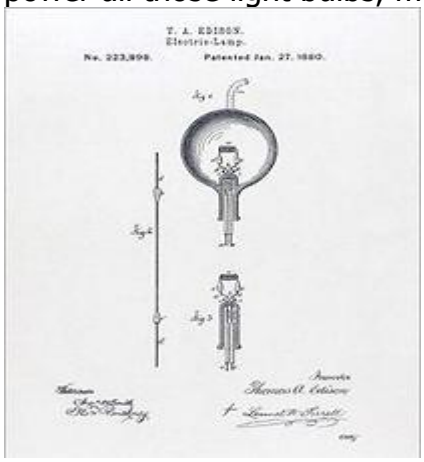
Thomas Edison's record 1,093 patented inventions have greatly improved the world we know today. In fact, Edison is recognized as one of the greatest inventors of all time. His key inventions include the light bulb and electric utility system, recorded sound, motion pictures, R&D labs, and the alkaline family of storage batteries. His 4,000 invention notebooks chronicle the invention challenges of the late 19th and early 20th centuries, telling a vivid story of man's progress to a technological society.

Thomas Edison's Light Bulb

Thomas Edison is most well-known for his invention of the light bulb. Contrary to popular belief, Edison did not invent the light bulb; it had been around for a number of years. The electric lights at the time, however, were unreliable, expensive, and short-lived. Over twenty distinct efforts by other inventors the world over were already underway when Edison entered the light bulb invention race.

By creating a vacuum inside the bulb, finding the right filament to use, and running lower voltage through the bulb, Edison was able to achieve a light bulb that lasted for many hours. This was a substantial improvement, and one that led with more improvements, to making the light bulb practical and economical.

Of course, Edison also later invented the entire electric utility system so he could power all those light bulbs, motors and other appliances that soon followed.

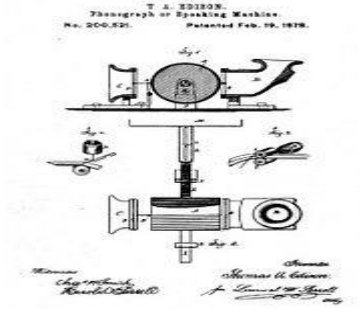


Thomas Edison's Phonograph

Considered to be the first great Thomas Edison invention, and his life-long favorite, the phonograph would record the spoken voice and play it back.

When speaking into the receiver, the sound vibration of the voice would cause a needle to create indentations on a drum wrapped with tin foil. Later Edison would adopt cylinders and discs to permanently record music.

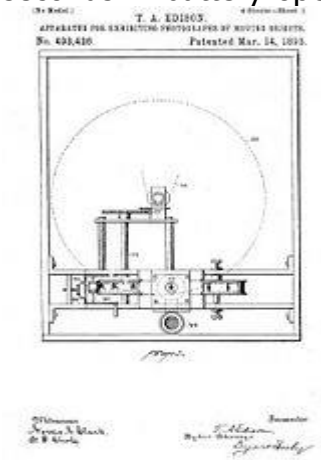
The first recorded message was of Thomas Edison speaking "Mary had a little lamb", which greatly delighted and surprised Edison and his staff when they first heard it played back to them.



Thomas Edison's Motion Picture

Edison's initial work in motion pictures (1888-89) was inspired byMuybridge's analysis of motion. The first Edison device resembled his phonograph, with a spiral arrangement of 1/16 inch photographs made on a cylinder. Viewed with a microscope, these first motion pictures were rather crude, and hard to focus. Working with W. K. L. Dickson, Edison then developed the Strip Kinetograph, using George Eastman's improved 35 mm celluloid film. Cut into continuous strips and perforated along the edges, the film was moved by sprockets in a stop-and-go motion behind the shutter.

In Edison's movie studio, technically known as a Kinetographic Theater, but nicknamed "The Black Maria" (1893), Edison and his staff filmed short movies for later viewing with his peep hole Kinetoscopes (1894). One-person at a time could view the movies via the Kinetoscope. Each Kinetoscope was about 4 feet tall, 20 inches square, and had a peep hole magnifier that allowed the patron to view 50 feet of film in about 20 seconds. A battery-operated lamp allowed the film to be illuminated.

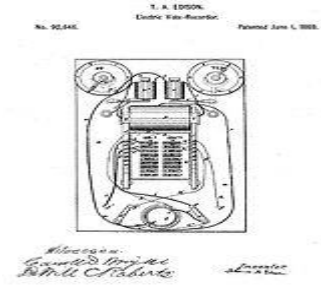


Thomas Edison's Electrographic Vote Recorder

Edison was 22 years old and working as a telegrapher when he filed his first patent for the Electrographic Vote Recorder.

The device was made with the goal of helping legislators in the US Congress record their votes in a quicker fashion than the voice vote system.

To work, a voting device was connected to a clerk's desk where the names of the legislators were embedded. The legislators would move a switch to either yes or no, sending electric current to the device at the clerks desk. Yes and No wheels kept track of the votes and tabulated the final results.

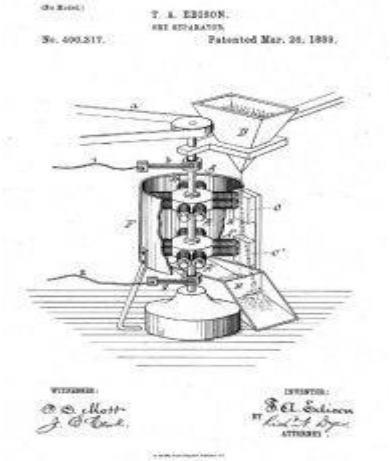


Thomas Edison's Magnetic Iron Ore Separator

Thomas Edison experimented during the 1880's and 1890's with using magnets to separate iron ore from low grade, unusable ores. His giant mine project in northwestern NJ consumed huge amounts of money as experimentation plodded forward.

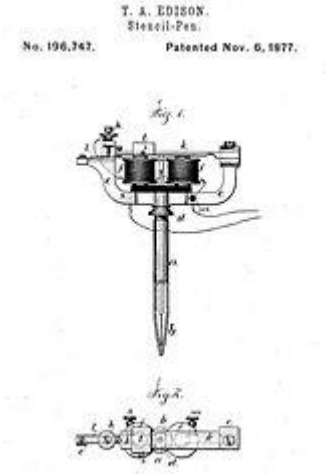
Engineering problems and a decline in the price of iron ore [the discovery of the Mesabi iron rich ore deposits near the Great Lakes] all lead this invention to be abandoned.

But later, Edison used what he learned with rock grinding to make his own robust version of Portland Cement, Edison Portland Cement, a very good product that built Yankee Stadium. Along the way, Edison totally revolutionized the cement kiln industry.



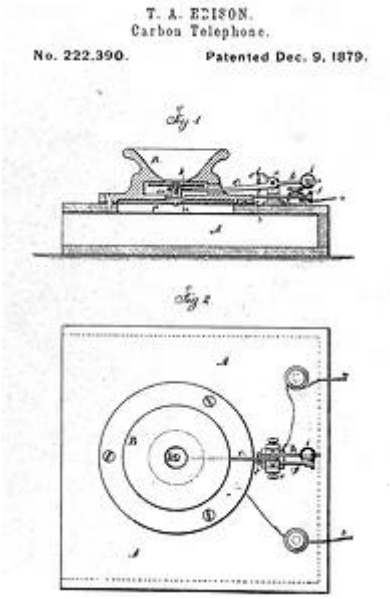
Thomas Edison's Electric Pen

In 1876, Thomas Edison invented the first electric copy machine to create copies of his notes. Using a small motor, the pen makes a tiny needle go up and down that produce a series of holes (50 per second) that are later gone over with a roller to press ink through the holes to create many copies of the document. Edison claimed that over 5000 copies could be made at once. This lesser known invention would not only be a precursor to the copy machine, but the tattoo pen as well.



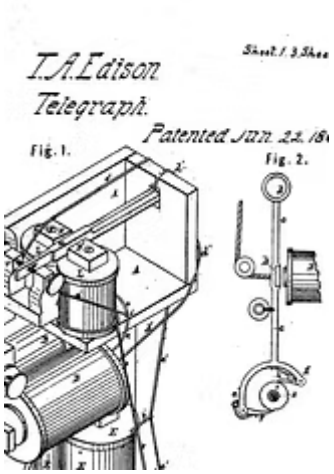
Thomas Edison's Carbon Transmitter

Thomas Edison improved Alexander Graham Bell's system with his carbon transmitter, by elongating how far apart phones could be. This invention used a battery and carbon to vary the resistance and control the strength of the current on the phone line. His design used a transmitter with lampblack carbon behind the diaphragm in the phone so that when sound waves moved it, they would also change the pressure on the carbon. He later improved by using granules made from coal instead and this basic design was commonly used until the 1980s.



Thomas Edison's Automatic Telegraph

Thomas Edison worked on automatic telegraphs between 1870 and 1874. The invention embossed special indents into a rotating cardboard disc with a needle powered by an electromagnet. It would then would form a recorded message that could be transmitted without an operator.



Edison later invented the Quadruplex Telegraph to send two messages at the same time on the same wire and a Wireless Telegraph for radio communications between ships that worked using a vibrator magnet instead of an electromagnetic wave,

Kindly visit these Web Links for more information

01] https://www.thomasedison.org/inventions

02] https://en.wikipedia.org/wiki/List_of_Edison_patents

Here is a **list of Edison patents**. Thomas Edison was an inventor who accumulated **2,332** patents worldwide for his inventions. **1,093** of Edison's patents were in the United States, but other patents were approved in countries around the globe.

03] **https://www.thomasedison.org/edison-patents**

Thomas Edison Patents

In his lifetime, Thomas Edison was awarded **1,093 U.S. patents** across a wide variety of technologies. Including his foreign patents filed in other countries, his total is 2,332. His record wasn't surpassed until 2003 by a Japanese inventor, 72 years after Edison's final patent application. Some of Edison's most famous patents are the light bulb, phonograph, motion picture camera, and storage battery. However, what makes Edison such an important figure in the world of invention isn't the success of few patents, but instead is the depth and breadth of his work.

His patents can be grouped into roughly eight categories:

- Electric light & power: 425
- Phonographs and recorded sound: 200
- Telegraphy and telephony: 185
- Batteries: 145
- Mining and iron ore milling: 50
- Cement: 40
- Motion pictures: 10
- Miscellaneous: 50

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PATENTS

Edison appears to have had two great periods where his patent applications soared, **1872-1890 and 1897-1912**; but throughout his career there was a steady flow of ideas and concepts for new products. He also meticulously recorded his work in 4,000 notebooks to protect his intellectual property, influencing generations of inventors and entrepreneurs who would follow in his footsteps.

The Emergence of Research & Design

Thomas Edison's legendary labs in West Orange, New Jersey are the culmination of the inventive work started in his earlier labs in Newark, New Jersey and Menlo Park, New Jersey. At West Orange, Edison combined invention and entrepreneurial activities, demonstrating how invention had grown from its cottage industry roots to a full-scale commercial enterprise, destined to be an essential part of modern business. Here, he perfected the embodiment of the Research & Design labs in support of new product development.

From his office/library at West Orange, the great inventor managed thirty companies under the umbrella of Thomas A. Edison Industries, Inc., employing over 10,000 workers in the design, prototyping and commercialization of many new patents and products to be sold around the world.

Thomas Edison's Top 100 Patents:

1. Patent #90,646 – June 1, 1869 – Improvement in Electrographic Vote-Recorder
2. Patent #91,527 – June 22,1869 – Improvement in Printing-Telegraphs
3. Patent #96,681 – November 9, 1869 – Automatic Electrical Switch for Telegraph Apparatus
4. Patent #111,112 – January 24, 1871 – Improvement in Governors for Electro-Motors
5. Patent #114,656 – May 9,1871 – Improvement in Telegraphic Transmitting Instruments
6. Patent #114,657 – May 9,1871 – Improvement in Relay-Magnets for Telegraph Instruments

7. Patent #128,608 – July 2, 1872 – Improvement in Printing-Telegraph Instruments
8. Patent #130,795 – August 27, 1872 – Improvement in Electro-Magnets
9. Patent #131,334 – September 17, 1872 – Improvement in Rheotomes or Circuit-Directors
10. Patent #132,455 – October 22, 1872 – Improvement in Paper for Chemical Telegraphs
11. Patent #133,841 – December 10, 1872 – Improvement in Type-Writing Machines
12. Patent #141,777 – August 12,1873 – Improvement in Relay-Magnets
13. Patent #142,999 – September 23, 1873 – Improvement in Galvanic Batteries
14. Patent #146812 – January 27, 1874 – Improvement in Telegraph-Signal Boxes
15. Patent #147,917 – February 24, 1874 – Improvement in Duplex Telegraphs
16. Patent #150,848 – May 12, 1874 – Improvement in Chemical or Automatic Telegraphs
17. Patent #154,788 – September 8, 1974 – Improvement in District Telegraph Signal-Boxes
18. Patent #169,972 – November 16, 1875 – Improvement in Electric-Signaling Instruments
19. Patent #200,521 – February 19,1871 – Improvement in Phonograph or Speaking Machines
20. Patent #201,760 – March 26, 1878 – Improvement in Speaking-Machines
21. Patent #203,017 – April 30, 1878 – Improvement in Telephone Call-Signals
22. Patent #203,329 – May 7, 1878 – Improvement in Perforating-Pens
23. Patent #205,370 – June 25, 1878 – Improvement in Pneumatic Stencil-Pens
24. Patent #210,767 – December 10, 1878 – Improvement in Vocal Engines
25. Patent #214,637 – April 22, 1879 – Improvement in Thermal Regulators for Electric Lights
26. Patent #217,781 – July 22, 1879 – Improvement in Sextuplex Telegraphs
27. Patent #218,166 – August 5, 1879 – Improvement in Magneto-Electric Machines
28. Patent #218,866 – August 26, 1879 – Improvement in Electric Lighting Apparatus
29. Patent #222,390 – December 9, 1879 – Improvement in Carbon-Telephones
30. Patent #223,898 – January 27, 1880 – Electric Lamp
31. Patent #228,329 – June 1, 1880 – Magnetic Ore-Separator
32. Patent #228,617 – June 8, 1880 – Brake for Electro-Magnetic Motors
33. Patent #230,621 – August 3, 1880 – Addressing-Machine
34. Patent #238,868 – March 15, 1881 – Manufacture of Carbons for Incandescent Electric Lamps
35. Patent #239,148 – March 22, 1881 – Treating Carbons for Electric Lamps
36. Patent #239,151 – March 22, 1881 – Method of Forming Enlarged Ends on Carbon Filaments
37. Patent #239,153 – March 22, 1881 – Electric Lamp
38. Patent #239,374 – March 29, 1881 – Regulating the Generation of Electric Currents
39. Patent #240,678 – April 26, 1881 – Webermeter
40. Patent #242,901 – June 14, 1881 – Electric Meter

41. Patent #248,425 – October 18, 1881 – Apparatus for Producing High Vacuums
42. Patent #248,430 – October 18, 1881 – Electro-Magnetic Brake
43. Patent #248,431 – October 18, 1881 – Preserving Fruit
44. Patent #248,434 – October 18, 1881 – Governor for Electric Engines
45. Patent #248,435 – October 18, 1881 – Utilizing Electricity as a Motive Power
46. Patent #251,552 – December 27, 1881 – Underground Conductor
47. Patent #263,132 – August 22, 1882 – Electro-Magnetic Railway
48. Patent #263,144 – August 22, 1882 – Mold for Carbonizing Incandescents
49. Patent #263,149 – August 22, 1882 – Commutator for Dynamo or Magneto Electric Machines
50. Patent #265,775 – October 10, 1882 – Electric-Arc Light
51. Patent #271,614 – February 6, 1883 – Shafting
52. Patent #273,489 – March 6, 1883 – Turn-Table for Electric Railways
53. Patent #273,491 – March 6, 1883 – Regulator for Driving Engines of Electrical Generators
54. Patent #273,492 – March 6, 1883 – Secondary Battery
55. Patent #273,493 – March 6, 1883 – Valve-Gear for Electrical Generator-Engines
56. Patent #273,715 – March 13, 1883 – Art of Malleableizing Iron
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58. Patent #293,433 – February 12, 1884 – Insulation of Railroad-Tracks Used for Electric Circuits
59. Patent #295,990 – April 1, 1884 – Type-Writer
60. Patent #304,084 – August 26, 1884 – Device for Protecting Electric-Light Systems from Lightning
61. Patent #314,115 – March 17, 1885 – Chemical Stock Quotation Telegraph
62. Patent #340,707 – April 27, 1886 – Telephonic Repeater
63. Patent #340,709 – April 27, 1886 – Telephone-Circuit
64. Patent #350,235 – October 5, 1886 – Railway-Telegraphy
65. Patent #365,465 – June 28, 1887 – Valve-Gear
66. Patent #378,044 – February 14, 1888 – Telephone-Transmitter
67. Patent #380,100 – March 27, 1888 – Pyromagnetic Motor
68. Patent #382,414 – May 8, 1888 – Burnishing Attachment for Phonographs
69. Patent #382,416 – May 8, 1888 – Feed and Return Mechanism for Phonographs
70. Patent #382,419 – May 8, 1888 – Process of Duplicating Phonograms
71. Patent #386,974 – July 31, 1888 – Phonograph
72. Patent #393,463 – November 27, 1888 – Machine for Making Phonogram-Blanks
73. Patent #397,280 – February 5, 1889 – Phonograph Recorder and Reproducer
74. Patent #397,705 – February 12, 1889 – Method of Winding Field-Magnets
75. Patent #425,761 – April 15, 1890 – Incandescent Lamp
76. Patent #430,279 – June 17, 1890 – Voltaic Battery
77. Patent #434,586 – August 19, 1890 – Electric Generator
78. Patent #434,587 – August 19, 1890 – Thermo-Electric Battery
79. Patent #434,589 – August 19, 1890 – Propelling Mechanism for Electric Vehicles
80. Patent #438,305 – October 14, 1890 – Fuse-Block
81. Patent #439,391 – October 28, 1890 – Junction-Box for Electric Wires

82. Patent #457,343 – August 11, 1891 – Magnetic Belting
83. Patent #465,970 – December 29, 1891 – Armature Connection for Motors or Generators
84. Patent #470,927 – March 15, 1892 – Driving Mechanism for Cars
85. Patent #470,928 – March 15, 1892 – Alternating-Current Generator
86. Patent #470,930 – March 15, 1892 – Dynamo-Electric Machine
87. Patent #476,984 – June 14,1892 – Expansible Pulley
88. Patent #476,985 – June 14, 1892 – Trolley for Electric Railways
89. Patent #479,184 – July 19, 1892 – Fac-Simile Telegraph
90. Patent #493,426 – March 14, 1893 – Apparatus for Exhibiting Photographs of Moving Objects
91. Patent #589,168 – August 31, 1897 – Kinetographic Camera
92. Patent #641,281 – January 16, 1900 – Expanding Pulley
93. Patent #657,922 – September 18, 1900 – Apparatus for Reheating Compressed Air for Industrial Purposes
94. Patent #661,238 – November 6, 1900 – Machine for Forming Pulverized Material Into Briquets
95. Patent #678,722 – July 16, 1901 – Reversible Galvanic Battery
96. Patent #722,502 – March 10, 1903 – Means for Handling Cable-Drawn Cars on Inclines
97. Patent #750,102 – January 19, 1904 – Electrical Automobile
98. Patent #772,647 – October 18, 1904 – Photographic Film for Moving-Picture Machines
99. Patent #775,600 – November 22, 1904 – Rotary Cement-Kiln
100. Patent #909,169 – January 12, 1909 – Waterproofing-Paint for Portland-Cement Structures

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Thomas Edison's Historical Garage

https://www.thomasedison.org/thomas-edison-historical-garage

Visiting the Thomas Edison Garage at his Glenmont Home Estate is a treat for many visitors each year. The cement garage was built in 1908, and to this day houses one of the earliest electric vehicle charging stations as well as his and his wife's vehicles.

On a good day, over 200 members of the public enjoy the vintage cars, including the Ford Model T he received as a gift from Henry Ford and the electric cars that used Edison's famous nickel-iron alkaline storage batteries.

In 2017, the Edison Innovation Foundation helped restore the cars and garage for about $2.5 million! The project included restoring the cars (some to running condition), cleaning and repainting the walls and ceiling, repairing some of the special garage features like the rotating turntable, and adding some special educational exhibits for visitors.

The Ford Model T outside Thomas Edison's Cement Garage

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Glenmont Estate

Thomas Edison's Historical Home

https://www.thomasedison.org/glenmont

WEST ORANGE, NEW JERSEY

Thomas Edison's home was built as an Americanized version of the Queen Anne Victorian style in 1880-82. It contained all the rudiments of today's modern home—hot and cold running water, indoor bathrooms with flush toilets, central heating (via gravity convection), and refrigeration (via ice storage). Edison later wired the home for electricity in 1887.

The Glenmont Estate is an imposing structure whose extreme dimensions measure approximately 125 feet long, 116 feet wide, and 54 feet high. It originally contained 23 rooms, including 2 ½ bathrooms. A magnificent semicircular conservatory graces the south side of the home. The construction of Glenmont includes over 157,000 bricks, and in excess of 10,000 pounds of iron and steel framing. There are 23 fireplaces exiting through 7 chimneys. A total of 94 exterior windows grace the building, 41 of them adorned with canvas awnings. Over the years, the Edison's added 6 more bathrooms, mostly on the second floor, for a total room count of 29 and ½ .

The name "Glenmont" is believed to be derived from the home's proximity to a "glen" or ravine; while at the same time, the home sits on the apex of the "mount" of the property … hence the contraction Glenmont. The estate was named by its original owners Henry and Louise Pedder. No formal documents or maps exist, officially proclaiming the property as Glenmont.

The Edison estate resides in beautiful and historic Llewellyn Park, originally envisioned by Llewellyn Haskell in 1850 as a bucolic hillside refuge from the already teaming and exploding city populations of New York and Newark, NJ. The park is the first planned

residential community in America, embodying the philosophy and vision of the country's leading land planners and landscape architects……including the legendary Olmstead of Central Park fame. Billed as "country living for city folk" Llewellyn Park was and still is a verdant and tranquil environment. In Edison's time, businessmen living in the park often commuted to New York, taking a train line at the bottom of the hill to Hoboken, NJ, and then a ferry across the Hudson to New York. Modern day businessmen still commute to New York, but the old train line is gone. Llewellyn Park is less than 20 miles from New York.

The Pedders originally commissioned architect Henry Hudson Holly to build Glenmont. Henry Pedder was a confidential secretary for the prestigious Arnold Constable Company in New York. Unknown to the company however, was Pedder's stealing of corporate funds to finance the construction and furnishing of lovely Glenmont. Pedder and several other employees were in on the siphoning of Constable's largess. In 1884, Pedder's scheme was uncovered, and he was forced to hand over Glenmont to Constable.

Enter Tom and Mina Edison

In 1884, Edison's first wife Mary Stillwell Edison dies young. He has 3 children; and a big project underway in New York to demonstrate his electric power station and distribution system for lighting … not to mention a broken heart. Through an arranged matchmaking operation, one of Edison's good friends introduces Mina to Thomas in 1885, and in 1886, they marry. He was 39, she 19. His oldest daughter by the first marriage was 13 at the time.

Looking for a place near his contemplated new West Orange laboratories, Edison buys Glenmont in a distress sale, completely furnished, with barn and livestock, greenhouse, and all the grounds for $125,000. Mina had her choice of this estate or a townhouse in New York and wisely selected Glenmont. In the 1890s, Tom would sell the entire estate to Mina for $1, so no one could ever lay claim to his family's home as the result of a legal suit against his inventions and manufacturing facilities.

In all, Tom and Mina would raise 6 children at Glenmont, Edison's first three, Marion, Thomas Jr. and William; plus three more of their own, Madeline, Charles, and Theodore. The first set of children did not fare as well as the second. Contributing factors were probably: the traumatic death of their mother; Edison's heavy work schedule at his Menlo Park site before moving to West Orange and the lack of time he spent with them; and, their original grounding in formal schooling was rather weak and insufficient to prepare them properly for the world. This was especially hard on Marion, whose temperament conflicted with Mina's. This would be a problem between the two for several decades. Edison does spend more time with his second set of children, but his sometimes long absences is felt by them as well. As the most beautiful and spacious den at Glenmont attests, with all its attributions to Edison's accomplishments, the man was a difficult model to follow, probably not all that much different than being the children of a famous actor or public figure.

Mina did a superb job of managing Glenmont. It was she who managed his social calendar, and kept him squared away with the many prominent people who came visiting at Glenmont; and there were many indeed. Before they became presidents, Wilson and Hoover ate there; as did the great conservationists and environmental activists, John Burroughs and John Muir (of Muir Woods in CA fame). Maria Montessori, Helen Keller, The kings of Siam and Sweden, and many great industrialists like Henry Ford, George Eastman, and Harvey Firestone spent time at the home. In the company of such great people, this can be hard on children to fathom just how famous their father is; and may also have been a contributing factor to their early development. Edison was not an easy man to deal with. He was stubborn and self-made, a potent combination that often results in excessive self-pride, not easily admitting to mistakes.

Daughter Madeline leaves interesting thoughts and reminisces about her dad's eccentricities, a most telling one is, "My father had a strange affliction, he was the only person who could develop indigestion before dinner." This was his chief excuse for leaving his dinner guests chatting with his understanding wife. He much preferred to spend his evenings in his upstairs "thought laboratory", a commodious living room on the second floor, about 36 feet long by 25 feet wide, where surrounded by books, Edison spent hours developing the ideas his excellent staff would hammer into reality at his request. If he could avoid those pesky formal dinners, he would much rather do it. Most of his life, Edison was spare in his eating, preferring to follow a rigid philosophy of nourishment that contained just what he felt he needed and nothing more—although he did have a weakness for pies, taking a large chunk at lunch. But those formal dinners, he felt were wasteful of time.

His son Charles, who also was afflicted with hearing problems like his father, rose to become governor of New Jersey in 1941. Youngest son Theodore became a respectable inventor like his dad. Both sons went to MIT, and later put in considerable time helping dad manage the 30 or so companies that made up the Thomas A. Edison Corporation. Theodore also did some private consulting on his own. The much talked about deafness of Edison is now interpreted as being most likely due to a congenital problem, or perhaps spurred on by early childhood illness. Thomas was a delicate child.

In time however, he would grow into a more robust and highly motivated young man, essentially on his own by his early teenage years. This self-reliance would be his hallmark for the rest of his life, driving him relentlessly to solve problems. For him, the thrill was in the chasing down of the problem. This he loved. He was a hunter of solutions. As he was fond of saying, "All good things come to those who hustle while they wait".

He did engage his children in his problem-solving quests. To this day, one can see the little slips of paper in the many books of his living room library. His children would search out subject matter he was interested in reading and place the slips at the appropriate pages, piling the books on his large desk. After they went to bed, he would

spend hours reading the references they had discovered. In between such team-based book research, Edison did enjoy a rollicking good game of Parchesi—a game he loved to win, and was not bashful about changing the rules when it suited him!

Mrs. Edison gave much of her talents and interest to her family and the community. She hailed from Akron Ohio, the daughter of Lewis and Mary Valinda Miller. Lewis an inventor of farm equipment and machinery, was a wealthy man who brought up his large family in strict religious fashion. In fact, Lewis was one of the two men originally responsible for conceiving of the western New York state religious retreat known as Chataugua, today an ecumenical gathering place for many on retreat, or attending seminars and conferences. Mina was used to being surrounded by famous people and this helped her immensely in her duties at Glenmont.

Over the years, Mina became an ardent conservationist and bird watcher. The lovely estate is planted with tree, and shrub species from around the world, still a wonderful delight when the seasons change. The operating greenhouse still exists on the estate and contains some of the descendants of the original plants dating back to the time of Edison. Mina also gave tirelessly to many civic, fraternal, educational, and religious groups in the community. She strongly believed that youth should be educated in the classic liberal tradition, in both the sciences and art. She herself an accomplished musician, tried to give this gift to her children. In our current efforts to achieve equality of the sexes, Mina would wonder what is taking so long. She was her husband's equal, no doubt. She managed Glenmont, so Thomas could manage his labs. It was a partnership, as their adjoining desks in the upstairs living room attests.

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Importance of Thomas Edison's Quotes

The quotes below remain important
because they inspire others to think creatively,
work hard and pursue their passions.

"I have not failed. I've just found 10,000 ways that won't work."

“There are no rules here -- we're trying to accomplish something.”

“Genius is one percent inspiration, ninety-nine percent perspiration.”

"There's a better way to do it - Find it."

“Many of life's failures are people who did not realize how close they were to success when they gave up.”

“We often miss opportunity because it's dressed in overalls and looks like work.”

“The three great essentials to achieve anything worthwhile are, first, hard work; second, stick-to-itiveness; third, common sense.”

“If we all did the things we are really capable of doing, we would literally astound ourselves.”

“When you have exhausted all possibilities, remember this - you haven't.”

“Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time.”

"To invent, you need a good imagination and a pile of junk."

"The doctor of the future will give no medication, but will interest his patients in the care of the human frame, diet, and in the cause and prevention of disease."

"Just because something doesn't do what you planned it to do doesn't mean it's useless."

"Anything that won't sell, I don't want to invent. Its sale is proof of utility, and utility is success."

"A genius is often merely a talented person who has done all of his or her homework."

"Unfortunately, there seems to be far more opportunity out there than ability... We should remember that good fortune often happens when opportunity meets with preparation."

"I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil and coal run out before we tackle that. I wish I had more years left."

“I never did a day’s work in my life, it was all fun.”

"Show me a thoroughly satisfied man and I will show you failure."

"Nothing is impossible. We merely don't know how to do it yet."

"Everything comes to him who hustles while he waits."

"Science works slowly, even though it discovers the marvellous, the unlooked-for."

“My desire is to do everything within my power to free people from drudgery and create the largest measure of happiness and prosperity.”

“I find out what the world needs. Then I go ahead and try to invent it.”

“Personally, I enjoy working about 18 hours a day. Besides the short catnaps I take each day, I average about four to five hours of sleep per night."

"Being busy does not always mean real work. The object of all work is production or accomplishment and

to either of these ends there must be forethought, system, planning, intelligence and honest purpose, as well as perspiration."

"I always invented to obtain money to go on inventing."

"What you are will show in what you do."

"Anything that won't sell, I don't want to invent. Its sale is proof of utility, and utility is success."

"I have more respect for the fellow with a single idea who gets there than for the fellow with a thousand ideas who does nothing."

"I have friends in overalls whose friendship I would not swap for the favor of the kings of the world."

"There is no substitute for hard work."

"When I have finally decided that a result is worth getting, I go ahead on it and make trial after trial until it comes."

"The successful person makes a habit of doing what the failing person doesn't like to do."

"All progress, all success, springs from thinking."

"The best thinking has been done in solitude. The worst has been done in turmoil."

"Great ideas originate in the muscles."

"To have a great idea, have a lot of them."

"Fools call wise men fools. A wise man never calls any man a fool."

"Until man duplicates a blade of grass, nature can laugh at his so-called scientific knowledge...."

"The world owes nothing to any man, but every man owes something to the world."

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